

Please cancel claim 2 and amend claims 1, 3, 12, 16, 21, 24 and 26 – 31 as follows:

We claim:

1. (currently amended). A B-stageable underfill encapsulant, wherein the encapsulant solidifies during the B-stage process to produce a smooth, non-tacky surface on a semiconductor wafer or silicon chip and wherein the encapsulant comprises:

a) a thermal curable resin;

b) an imidazole-anhydride adduct;

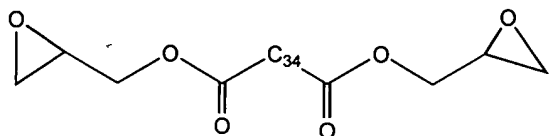
c) at least one solvent;

d) one or more fluxing agents; and

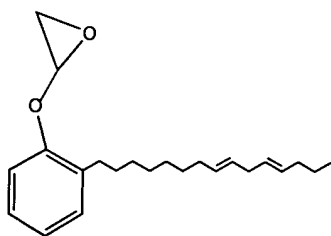
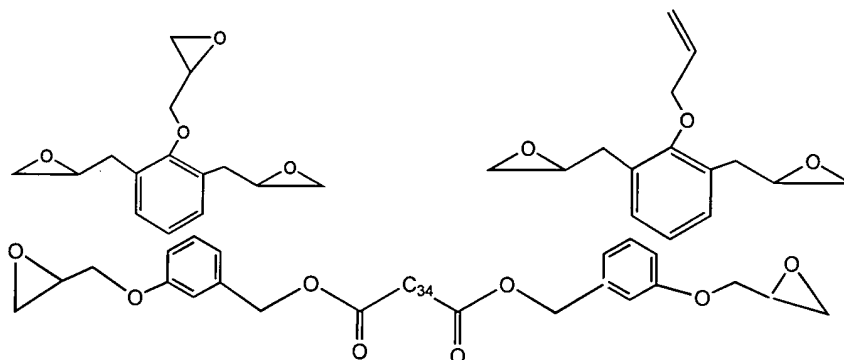
e) optionally, one or more of the group comprising surfactants, wetting agents, defoaming agents, coupling agents, inorganic fillers, reactive diluents, adhesion promoters, flow additives, air release agents, and mixtures thereof.

2. (cancelled).

3. (currently amended). The encapsulant of claim 1 [2], wherein the [at least one epoxy] thermal curable resin is selected from the group comprising monofunctional and multifunctional glycidyl ethers of Bisphenol-A, monofunctional and multifunctional glycidyl ethers of Bisphenol-F, aliphatic epoxies, aromatic epoxies, saturated epoxies, unsaturated epoxies, cycloaliphatic epoxy resins, epoxies having the structures



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or mixtures thereof.

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4. (original). The encapsulant of claim 3, wherein the at least one epoxy resin is selected from the group consisting of 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate,

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vinylcyclohexene dioxide, 3,4-epoxy-6-methyl cyclohexyl methyl-3,4-epoxycyclohexane carboxylate, dicyclopentadiene dioxide, bisphenol A resin, bisphenol F type resin, epoxy novolac resin, poly(phenyl glycidyl ether)-co-formaldehyde, biphenyl type epoxy resin, dicyclopentadiene-phenol epoxy resins, naphthalene epoxy resins, epoxy functional butadiene acrylonitrile copolymers, epoxy functional polydimethyl siloxane, and mixtures thereof.

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5. (original). The encapsulant of claim 4, wherein the epoxy resin comprises in the range of about 20 wt % to about 90 wt % of the encapsulant.

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6. (original). The encapsulant of claim 4, wherein the at epoxy comprises in the range of about 20 wt % to about 80 wt % of the encapsulant.

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7. (original). The encapsulant of claim 1, wherein the imidazole-anhydride adduct comprise an adduct of imidazole and anhydride selected from the group comprising pyromellitic dianhydride, methylhexa-hydro phthalic anhydride methyltetra-hydrophthalic anhydride, nadic methyl anhydride, hexa-hydro phthalic anhydride, tetra-hydro phthalic anhydride, dodecyl succinic anhydride, phthalic anhydride, bisphenyl dianhydride, benzophenone tetracarboxylic dianhydride, 1-cyanoethyl-2-ethyl-4-methyl-imidazole, alkyl-substituted imidazole, triphenylphosphine, onium borate, non-N-substituted imidazoles, 1,2,4,5-benzenetetracarboxylic dianhydride, 2-phenyl-4-methyl imidazole, 2-ethyl-4-methyl-imidazole, 2-phenyl imidazole, imidazole, N-substituted imidazole and mixtures thereof.

7
8. (original). The encapsulant of claim 7, wherein the imidazole-anhydride adduct comprises an adduct of 2-phenyl-4-methyl imidazole and pyromellitic dianhydride.

8
9. (original). The encapsulant of claim 8, wherein the imidazole-anhydride adduct is synthesized by combining 1 mole part 1,2,4,5-benzenetetracarboxylic dianhydride and 2 mole part 2-phenyl-4-methylimidazole.

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~~10~~. (original). The encapsulant of claim ~~7~~, wherein the imidazole-anhydride adduct comprises in the range of about 0.01 wt % to about 10 wt % of the encapsulant.

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~~11~~. (original). The encapsulant of claim ~~40~~, wherein the imidazole-anhydride adduct comprises in the range of about 0.1 wt % to about 5 wt % of the encapsulant.

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~~12~~. (currently amended). The encapsulant of claim ~~1~~ [2], wherein the at least one solvent is selected from the group comprising solvents that are stable and dissolve the epoxy resins in the composition.

18
~~13~~. (original). The encapsulant of claim ~~12~~, wherein the at least one solvent is selected from the group comprising ketones, esters, alcohols, ethers, γ -butyrolactone and propylene glycol methyl ethyl acetate (PGMEA) and mixtures thereof.

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~~14~~. (original). The encapsulant of claim ~~13~~, wherein the at least one solvent is selected from the group comprising γ -butyrolactone, propylene glycol methyl ethyl acetate (PGMEA) and mixtures thereof.

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~~15~~. (original). The encapsulant of claim ~~12~~, wherein the solvent comprises in up to about 80 wt % of the encapsulant.

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~~16~~. (currently amended). The encapsulant of claim ~~1~~ [2] further comprising at least one fluxing agent.

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~~17~~. (original). The encapsulant of claim ~~16~~ wherein the at least one fluxing agent is selected from the group comprising carboxylic acids, rosin gum, dodecanedioic acid, adipic acid, sebacic acid, polysebasic polyanhydride, maleic acid, tartaric acid, citric acid, alcohols, hydroxyl acid and

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hydroxyl base, polyols such as ethylene glycol, glycerol, 3-[bis(glycidyl oxy methyl) methoxy]-1,2-propane diol, D-ribose, D-cellobiose, cellulose, 3-cyclohexene-1,1-dimethanol, and mixtures thereof.

~~17~~ ~~16~~
~~18~~. (original). The encapsulant of claim ~~17~~, wherein the at least one flux agent comprises rosin gum, dodecanedioic acid, adipic acid, or mixtures thereof.

~~18~~ ~~17~~
~~19~~. (original). The encapsulant of claim ~~18~~, wherein the at least one flux agent comprises in the range of about 0.5 wt % to about 20 wt % of the encapsulant.

~~19~~ ~~18~~
~~20~~. (original). The encapsulant of claim ~~19~~, wherein the at least one flux agent comprises in the range of about 1 wt % to about 10 wt % of the encapsulant.

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~~21~~. (currently amended). The encapsulant of claim 1 [2], wherein the encapsulant further comprises one or more of group consisting of surfactants, wetting agents, defoaming agents, coupling agents, inorganic fillers, reactive diluents, adhesion promoters, flow additives, air release agents, and mixtures thereof.

~~21~~ ~~20~~
~~22~~. (original). The encapsulant of claim ~~21~~ wherein the surfactant is selected from the group consisting of organic acrylic polymers, silicones, epoxy-silicones, polyoxyethylene/polyoxypropylene block copolymers, ethylene diamine based polyoxyethylene/polyoxypropylene block copolymers, polyol-based polyoxyalkylenes, fatty alcohol-based polyoxyalkylenes, fatty alcohol polyoxyalkylene alkyl ethers and mixtures thereof.

~~22~~ ~~21~~
~~23~~. (original). The encapsulant of claim ~~22~~ wherein the reactant diluent is selected from the group comprising p-tert-butyl-phenyl-glycidyl ether, allyl glycidyl ether, glycerol diglycidyl ether, glycidyl ether of alkyl, butanedioldiglycidylether and mixtures thereof.

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83 ~~24~~. (currently amended). The encapsulant of claim 1 [2] wherein the underfill encapsulant is applied to a semiconductor wafer and B-stage processed before the semiconductor wafer is diced into individual chips.

84 ~~25~~. (original). A silicon wafer having a B-stageable underfill composition deposited on one face of the wafer, the B-stageable composition comprising

- a) a thermal curable resin;
- b) an imidazole-anhydride adduct;
- c) at least one solvent;
- d) one or more fluxing agents; and
- e) optionally, one or more additive selected from the group comprising surfactants, wetting agents, defoaming agents, coupling agents, inorganic fillers, reactive diluents, adhesion promoters, flow additives, air release agents, and mixtures thereof.

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~~26~~. (currently amended). A method of preparing one or more silicon chips, comprising the steps of

- a) applying the encapsulant of claim 1 [2] to a semiconductor wafer;
- b) B-stage processing the encapsulant on the semiconductor wafer so that the encapsulant solidifies into a smooth, non-tacky coating; and
- c) dicing the semiconductor wafer into individual silicon chips.

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~~26~~. (currently amended). ²⁵
~~27~~. The method of claim ~~26~~ [25], wherein the encapsulant is applied to the semiconductor wafer via spin coating, screen printing or stencil printing.

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~~27~~. (currently amended). ²⁸
~~28~~. A method of preparing an electronic package comprising the steps of

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- a) applying the encapsulant of claim 1 [2] to a semiconductor wafer;
 - b) B-stage processing the encapsulant on the semiconductor wafer so that the encapsulant solidifies into a smooth, non-tacky coating;
 - c) dicing the semiconductor wafer into multiple silicon chips, with each chip having a first side coated with the encapsulant;
 - d) placing one or more silicon chips on a substrate so that the first side of the silicon chip is adjacent to the substrate; and
 - e) heating the one or more silicon chips and substrate to a temperature sufficient to form interconnections between the one or more silicon chips and the substrate.

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~~28~~. (currently amended). ²⁷
~~29~~. The method of claim ~~28~~ [27], comprising the additional step of placing an unfilled liquid curable fluxing material on the substrate before the silicon chip is placed on the substrate.

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~~[28]~~ (currently amended), ²⁹~~30~~. The method of claim ²⁸~~29~~ [28], wherein the unfilled liquid curable
fluxing material comprises

- a) a thermal curable epoxy resin;
- b) an imidazole-anhydride adduct; and
- c) at least one fluxing agent.

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~~[30]~~ (currently amended), ³⁰~~31~~. The method of claim ²⁹~~30~~ [29], wherein the imidazole-anhydride
adduct comprise an adduct of imidazole and anhydride selected from the group comprising
pyromellitic dianhydride, methylhexa-hydro phthalic anhydride methyltetra-hydrophthalic
anhydride, nadic methyl anhydride, hexa-hydro phthalic anhydride, tetra-hydro phthalic
anhydride, dodecyl succinic anhydride, phthalic anhydride, bisphenyl dianhydride, benzophenone
tetracarboxylic dianhydride, 1-cyanoethyl-2-ethyl-4-methyl-imidazole, alkyl-substituted imidazole,
triphenylphosphine, onium borate, non-N-substituted imidazoles, 2-phenyl-4-methyl imidazole, 2-
ethyl-4-methyl-imidazole, 2-phenyl imidazole, imidazole, N-substituted imidazole and mixtures
thereof.

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~~[31]~~ (currently amended), ³¹~~32~~. The encapsulant of claim ³⁰~~31~~ [30], wherein the imidazole-
anhydride adduct comprise an adduct of 2-phenyl-4-methyl imidazole and pyromellitic
dianhydride.

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